

The Impact of ICT Expenditures on Institutionalized Democracy and Foreign Direct Investment in Developing Countries

Daniel S. Soper*, Haluk Demirkan, Michael Goul, and Robert St. Louis
Department of Information Systems, W. P. Carey School of Business, P.O. Box 874606
Arizona State University, Tempe, AZ 85287-4606

* Corresponding Author E-Mail: Daniel.Soper@asu.edu

Abstract

The impacts of ICT expenditures on developing countries are examined by relying on theories of adaptive structuration, global and local adaptation, and network society. Local adaptation to globalization is addressed through an empirical analysis of both the economic and political subsystems of developing countries. Least-squares regression models are used to investigate the impact of ICT expenditures on institutionalized democracy and foreign direct investment over a five-year period following the initial expenditures. ICT expenditures are shown to have a strong positive impact on future levels of foreign direct investment, as well as on future levels of institutionalized democracy in developing countries. The level of institutionalized democracy is also shown to mediate the impact of ICT expenditures on foreign direct investment. The implications of these findings for policy-makers are presented and discussed.

1. Introduction

It is increasingly appropriate to consider the impacts of Information and Communications Technology (ICT) expenditures on developing countries through lenses adapted from both rationalist and constructivist perspectives. The current study relies on several theories to examine the dynamics of ICT impacts in developing countries within the framework of globalization. The importance of examining the sociocultural, political, and economic consequences of the global digital divide has been emphasized by globalization researchers for several years. While there remains a broad lack of understanding about the unfolding relationships underlying globalization, there is agreement that many existing globalization studies suffer methodologically from concerns regarding change and continuity (e.g. [17]). Further, the preponderance

of empirical literature examining ICT expenditure impacts on developing countries focuses on specific simple dyadic relationships between factors such as ICT and productivity, ICT and foreign direct investment (FDI), and ICT and cross-border mergers and acquisitions.

Much of the current research discussing ICT expenditure impacts in developing countries is derived from prior work that focused on the impact of ICT investments on firm performance, labor productivity, and multi-factor productivity (e.g. [7, 15, 20]). In addition, the impacts of ICT investments on FDI have been identified as an important area of study (e.g. [1, 11]). FDI inflows to developing countries have become one of the most transparent measures of the increasing globalization of the world economy. These inflows are important to developing countries for several reasons [18]. First, the free flow of capital across national borders facilitates the search for the highest rate of return on investment. Second, FDI flows typically encourage the simultaneous transfer of both technology and corporate governance best practices. Third, FDI inflows encourage employee training programs that improve human capital. Finally, profits generated from productive applications of FDI contribute substantial corporate tax revenues to host country governments. In addition to these considerations, Bosworth and Collins [5] found that FDI inflows have nearly a one-to-one relationship with domestic investment, and that the benefits of FDI inflows are sufficient to offset the risk of allowing markets to freely allocate capital across the borders of developing countries.

Past research has also examined the relationship between democracy and FDI. One reason for such studies has been to investigate whether multinational corporations ignore political factors associated with civil rights and liberties in the countries that they invest in. It has been found that, on average, investments by multinational corporations are

significantly higher in democratic countries [6]. Studies have also been undertaken to examine how ICT impacts the processes associated with democracy (e.g. [4]), however very few studies exist that assess the specific impacts of ICT on democracy. Also conspicuously absent from the current literature are studies that go beyond examinations of simple dyadic associations to consider the more complex relationships associated with ICT impacts on developing countries. One notable exception is the work of Balamoune-Lutz [3] who focused on the nature and direction of links between ICT diffusion and per capita income, trade and financial liberalization, literacy and education, and freedom indicators including economic freedom, civil liberties and political rights. While the study found no support for the influence of FDI on ICT diffusion, the study's inclusion of a mix of economic factors and those that can be interpreted as social or political is important insofar as it represents an attempt to move toward a constructivist approach to conducting research in this area.

To summarize, current research in the area of ICT expenditure impacts on developing countries lacks unified theoretical foundations. Few studies exist that address change and continuity, and many studies rely solely on rationalist underpinnings. Additionally, very few studies in the current literature have endeavored to go beyond the examination of simple dyadic relationships.

1.1. Global ICT and local ICT adaptation

In order to address important questions such as those related to achieving the proper balance between emerging global ICT and local ICT adaptation, it is first necessary to discuss a generalizable description of a "local context." Fuchs has specified several relevant assumptions about the structure of a society [10]. At the basic level, local systems are composed of interconnected, but relatively autonomous self-organizing subsystems: the technosphere, the ecosphere, and the sociosphere. In the technosphere, humans make use of tools to achieve goals by transforming nature. In the ecosphere, human beings transform nature in order to organize natural resources in such a way that they can use those resources for their needs and goals. In the sociosphere, "humans enter social relationships in order to make sense of the world, to give meaning to actions and existence, and to form collective identities" [10]. The sociosphere can be further understood by considering the three interrelated and self-organizing subsystems of which it is composed, namely: the economic, the polity, and the cultural subsystems. In the economic subsystem,

humans use tools and natural resources to produce, allocate, distribute and consume goods and services to satisfy their needs. In the political subsystem, humans establish power structures in order to achieve collective decisions. In the cultural subsystem, humans produce a set of norms and values that guide and define living conditions and lifestyles. From this model of local sociospheres, we can begin to examine the concept of globalization.

Giddens defines globalization as the "intensification of worldwide social relations which link distant localities in such a way that local happenings are shaped by events occurring many miles away and vice versa" [12]. From the perspective of the local subsystems described above, globalization can therefore be thought of as based on the processes of disembedding, *i.e.* being distanced or estranged from mainstream ideological expectations, and then reembedding, *i.e.* adapting disembedded social relationships to local (temporal and spatial) conditions. Thus, the combined disembedding and reembedding processes are an interconnected expression of the dialectic of the global and the local contexts [10]. Addressing issues surrounding the balance of emerging global ICT and local ICT adaptation therefore requires an examination of the disembedding and reembedding processes from a variety of perspectives related to the three interconnected subsystems of the sociosphere. For example, since ICT can be thought of as existing mainly at the economic subsystem of the sociosphere, one might examine ICT impacts on other aspects of the economic subsystem (e.g. ICT impacts on FDI, ICT impacts on cross-border mergers and acquisitions, etc.). Similarly, ICT impacts can be considered on aspects of the polity subsystem (e.g. ICT impacts on institutionalized democracy) or components of culture (e.g. ICT impacts on the digital divide).

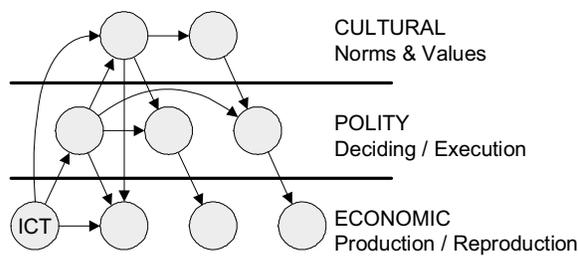


Figure 1. Potential sociosphere studies

More complex studies can simultaneously consider multiple layers (e.g. ICT impacts on aspects of the polity subsystem and the economic subsystem, ICT

impacts on the polity subsystem and the cultural subsystem with implications to the economic subsystem, etc.). A range of possible studies that are feasible given this analytic lens are shown in Figure 1. Each circle in Figure 1 represents a construct at a particular level in the sociosphere. An arrow represents a hypothesized relationship. For example, one study might assess a research model looking into the impact of ICTs at the polity level and at the economic level with the polity construct being a mediator of the dependent economic construct. An examination of the direct impact of the ICT construct on the dependent economic construct might also be included in the model. Traversing different paths of the graph provides different possibilities for the design of relevant studies.

To examine global and local adaptation according to the framework above, one can rely on Giddens' Structuration Theory which views organizations as systems with observable patterns of relationships among people and resources [12]. These systems are produced by the actions of people creating structures, which involve both rules and resources. Systems and structures exist in a dual relationship in which they produce and reproduce each other in an ongoing cycle. This process (the structuration process) can be stable or it can change substantially over time, depending on the environment. A developing country can be thought of as akin to an organization in the above depiction of Giddens' theory, and the relationship of Giddens' systems to the subsystems of a developing country's sociosphere is apparent. DeSanctis and Poole built on Giddens' work in their explication of Adaptive Structuration Theory [9], which examines why systems change over time. According to adaptive structuration theory, members of a group adapt rules and resources that they perceive to be necessary to accomplish their goals. The rules and resources both affect and are the outcome of iterations. This theory predicts that technology will be used in ways that work to increase the resources of the users. In the context of the framework discussed above, a local society is similar to members of a group, and the adaptation of rules and resources corresponds to adaptations between and among the subsystems of the sociosphere. These adaptations are stimulated by the pursuit of goals within the context of globalization, which involves the processes of disembedding and reembedding. In this context, adaptive structuration therefore predicts that ICT will be used in ways that work to increase the resources of the local society.

Castells' Theory of Network Society proposes that the members of a society serve as the nodes of a social system network, and that this network has

important consequences for the lives of each member [8]. Nodes join with other nodes that have similar resources and interests in the network. If a node fails to remain connected (via communication) with other nodes in the network, it may be dropped from the network and lose its ability to influence the society. ICT expenditures broaden the number of persons who can be connected to a network, and hence influence society. ICT alters interaction rules, and can therefore be expected to change both the opportunities to exert an influence and the desire to exert an influence within the network society. Additionally, as ICT expenditures greatly expand the ability of individuals to get and share information about the network, it should increase the desire for democratization. There are several reasons for this: First, information networks can be used to spread the ideas of universal democratic rights and to help foster worldwide debate on global democracy. Second, networks of international governmental and non-governmental organizations can serve as cradles of democracy for the societies of developing countries. Third, decentralized, complex networks can provide some immunity and protection from authoritarian structures, as communication of democratic ideals is less likely to be stifled. Finally, networks allow for the rapid dissemination of news and political information, as well as other digital sources of information that can influence political ideals and social norms.

In the following section, we formulate hypotheses for a study designed to assess ICT expenditure impacts on developing countries through the perspectives of the economic and polity subsystems of the sociosphere. The hypotheses examine relationships between constructs in these subsystems with directional predictions based on the theories of structuration and adaptive structuration, and on the theory of network society. It is important to note that our conceptualization of local adaptation within the context of globalization through subsystem self-organization requires methodological approaches that can view impacts of ICT expenditures over time. This is explained in more depth in the subsequent design and methodology section of the study.

2. Hypotheses

The theoretical discussion above implies that ICT expenditures can have wide ranging impacts on developing countries. Hereafter, we abbreviate the relevant theories as follows: the theories on Globalization and Local Adaptation will be referred to as GLA; the Theory of Network Society will be denoted as TNS, and Adaptive Structuration Theory

will be referred to as AST. Because ICT expenditures enhance transregional interconnectedness, GLA implies that ICT expenditures will widen the reach of networks of social activity and power. TNS predicts that this increase in connectedness will increase the ability to exert influence from a distance. Increasing both the feeling of connectedness and powerfulness can be expected to lead to increased foreign direct investment in a country. AST provides an additional reason for expecting ICT expenditures to lead to increased foreign direct investment, insofar as the theory predicts that technology will be used in ways that work to increase the resources of the users. ICT expenditures broaden the number of persons who can be connected to a social network, and therefore work to increase their resources. This increases the ability of governments and organizations to leverage their human assets and thereby creates an environment in which there are increased opportunities for growth and foreign investment. Stated as a hypothesis, this becomes:

Hypothesis 1: *Increased ICT expenditures will result in increased future foreign direct investment activity in developing countries.*

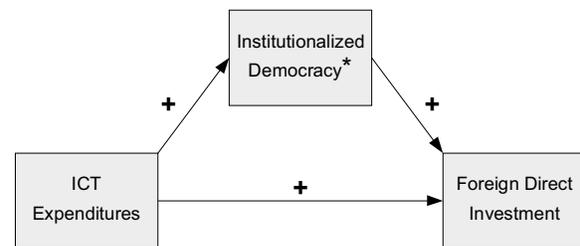
ICT expenditures also change the rules and opportunities for nodes in a social network (people, businesses, and governments) to interact. Large numbers of individuals suddenly have the ability to access and share information that previously was available to only a few. TNS predicts that this will increase the power of individuals that are connected to the network. AST predicts that connected individuals will want use that power to change the rules of society in order to allow them to leverage these new information resources. GLA suggests that manifestations of structural adaptations such as changing the rules of society will occur through the self-organizing subsystems of the sociosphere, including the polity. In emerging countries, institutionalizing democratic principles is one way to ensure that all persons that have access to information resources also have an opportunity to leverage those resources. Thus TNS, AST, and GLA lead to the expectation that increases in ICT expenditures will lead to future increases in institutionalized democracy. This is our second hypothesis.

Hypothesis 2: *Increased ICT expenditures will result in increased future institutionalized democracy in developing countries.*

The impact of ICT expenditures on foreign direct investment depends partially upon the extent to which

foreign investors believe an increased sense of interconnectedness leads to an increased ability to exert influence from a distance. The ability to exert influence from a distance depends in part upon the form of government in the country under investigation. As highly democratic countries have traditionally been more amenable to free market principles, it is expected that an emerging country's form of government will mediate the impact of ICT expenditures on attracting foreign direct investment. More specifically, the strength of the relationship between ICT expenditures and FDI should grow as a developing country becomes increasingly institutionalizes democratic principles. Hence, our third hypothesis is as follows:

Hypothesis 3: *The level of institutionalized democracy in a developing country mediates the impact of ICT expenditures on foreign direct investment, such that ICT expenditures will attract more future FDI in countries that have higher levels of institutionalized democracy.*



* mediates the relationship between ICT expenditures and FDI

Figure 2. Hypothesized relationships

The hypotheses examined by the current study are depicted graphically in Figure 2 above.

3. Design and methodology

This section describes the operationalization, data identification, and data collection procedures that were necessary to construct the least-squares regression models on which this research is based. The means by which the regression models were used to examine the hypotheses developed in the previous section are also presented and discussed.

3.1. Country identification

Following past research [2], the Standard and Poor's definition of emerging markets was used to identify the initial set of emerging countries for the present study. S&P defines an economy as emerging if it is located in a low or middle-income country, or

if the investable market capitalization of the economy is low relative to the country's gross domestic product [22]. Given this definition, Standard and Poor's currently categorizes fifty-three unique countries as containing emerging economies. These countries were used to form the initial country set for the current investigation.

As the analysis was intended to be restricted exclusively to developing countries, the latest World Bank List of Economies [27] was used to locate any high-income economies in the country set. This process led to the identification and removal of three high-income countries (*i.e.* Greece, Israel, and South Korea), reducing the total number of countries to fifty. The lack of availability of valid and authoritative data for the analysis required the exclusion of a further twenty-one countries, thereby yielding a final set of twenty-nine countries for the analysis¹. Partially data-driven sampling such as this is common in investigations of this type.

3.2. Selection of analysis period

The first large-scale concerted effort to promote the expansion of information and communication technologies in developing countries was undertaken by the United Nations in 1993 with the establishment of the Sustainable Development Networking Programme [26]. This conscious recognition by the UN of the importance of ICTs to developing economies, coupled with CERN's concurrent 1993 release of the World Wide Web into the public domain [14], provided the momentum and global awareness necessary to initiate the proliferation of ICTs in developing countries. The analytic period for the present study therefore begins in 1993 and continues through 2003, the last year for which data from all of the data sources were available.

3.3. Operationalization of constructs

Information and communication technology encompasses not only the realm of communications devices and computer systems, but also the telecommunications channels that interconnect those systems and devices. It is therefore necessary for any variable purporting to represent the degree of ICT expenditures in a country to include measures of investments made into all of those technologies. The

¹ Data from the following developing countries were used in this study: Argentina, Brazil, Bulgaria, Chile, China, Colombia, Czech Republic, Ecuador, Egypt, Hungary, India, Indonesia, Malaysia, Mexico, Nigeria, Pakistan, Peru, Philippines, Poland, Romania, Russia, Saudi Arabia, Slovakia, South Africa, Sri Lanka, Thailand, Turkey, Ukraine, and Venezuela.

World Bank Group's World Development Indicators database [28] was found to contain a variable specifically designed to measure these expenditures. This variable was therefore used to represent the ICT expenditure construct in the current investigation. For the purposes of the current study, the ICT expenditure measure was standardized by GDP (in current U.S. dollars) to allow valid comparisons to be made across different countries and across different years².

The overall degree of direct investment flowing into a country from foreign sources has been used frequently in the literature of many different disciplines to examine emerging economies (*e.g.* [1, 5, 18]). These investment flows, known formally as foreign direct investment (FDI), are also quantified as a single variable in the World Development Indicators database [28]. As with the ICT expenditures variable, this measure was standardized by GDP (in current U.S. dollars) to allow valid comparisons to be made across different countries and across different years³.

Assessing the extent to which institutionalized democracy exists in a given country is by no means a straightforward task. The Center for International Development and Conflict Management (CIDCM) conceptualizes institutionalized democracy as consisting of three interdependent components: (1) the ability of citizens to express preferences about alternative leaders and policies, (2) constraints on the exercise of power by the executive, and (3) the guarantee of civil liberties to citizens in acts of political participation and in their daily lives [19]. Over the past four decades, researchers at this center have painstakingly developed a scaled measure of institutionalized democracy. This measure is an additive function of the competitiveness and openness of the executive recruitment process, the competitiveness of political participation, and the extent to which the power of the executive is constrained. The measures developed by the CIDCM are currently the most widely used resources for studying and monitoring worldwide regime change and authority [19]. As such, the CIDCM measure of institutionalized democracy was determined to be suitable for use in the present study.

² The ICT expenditure variable used in this study is formally defined as: "The amount, in current U.S. dollars, spent on information technology products purchased by businesses, households, governments, and educational institutions from vendors or organizations outside the purchasing entity, as well as spending on internally customized software, capital depreciation, telecommunications, and other office equipment."

³ The foreign direct investment variable used in this study is formally defined as: "The amount, in current U.S. dollars, of investments made to acquire a lasting management interest in an enterprise operating in an economy other than that of the investor."

3.4. Data collection and preparation

Data from the two sources described above were compiled into a single repository and standardized into Z-scores. As data were gathered for twenty-nine countries across eleven years, the final data set consisted of 319 unique cases. Following past research in this area (e.g. [1]), data imputation was used to address missing values in the primary dataset. Specifically, the Markov Chain Monte Carlo (MCMC) multiple imputation method was used to impute missing values [13]. As computational power was not at a premium, missing values were calculated using twenty imputations per iteration in order to maximize the efficiency and effectiveness of the true value recovery process [21]. This technique not only prevents the loss of statistical power that accompanies listwise deletion, but also avoids the biases resulting from systematic differences between completely observed and incompletely observed cases that are inevitably introduced into a dataset when cases with missing values are deleted [23].

As noted previously, AST examines changes in systems over time. Implicit in this framework is the notion that adaptations to resource allocations do not occur instantaneously, but rather are absorbed into the system as time passes. To that end, the extent to which ICT expenditures impact institutionalized democracy and FDI is expected to change over time. Within the boundaries of the current study, it was therefore necessary to compute five separate time-lagged datasets by which the impact of ICT expenditures on future levels of institutionalized democracy and FDI in developing countries could be examined. Specifically, the exponentially mapped past average smoothing technique [24] was used to generate datasets quantifying the impact of ICT expenditures on institutionalized democracy and FDI one, two, three, four, and five years into the future. This technique has the advantage of reducing noise in the data, thereby allowing for an unbiased assessment of the rate of change in the data over time. A one-year time lag, for example, allows for a valid assessment of the extent to which the observed levels of institutionalized democracy and foreign direct investment in a developing country during a specific year were impacted by ICT expenditures made by that country during the previous year. A two-year time lag, then, allows for an assessment of the extent to which observed levels of FDI and institutionalized democracy in a country during a specific year were impacted by ICT expenditures made two years previously *after controlling for the impact of ICT expenditures made during the previous year*. While

this approach came at the expense of reducing the number of cases in the dataset by twenty-nine for every year into the future for which a time-lagged dataset was computed, the value of being able to assess future impacts of ICT expenditures clearly outweighs the minor accompanying loss of statistical power. Given the large sample size for the current study, the impact of the reduced number of cases on the stability of the regression models was negligible.

3.5. Regression models

As a means of evaluating how levels of institutionalized democracy and FDI in developing countries are impacted by past ICT expenditures, three least-squares regression models were independently constructed and assessed against the five time-lagged datasets described previously. The first model examined the direct impact of ICT expenditures on FDI (hypothesis 1). The second model examined the direct impact of ICT expenditures on institutionalized democracy (hypothesis 2). The third model was used in conjunction with the first model to examine the extent to which institutionalized democracy mediates the relationship between ICT expenditures and foreign direct investment (hypothesis 3). Following the approach developed by Judd and Kenny [16], the third model included both ICT expenditures and institutionalized democracy as predictors of FDI. The indirect effect of ICT expenditures on FDI as mediated by institutionalized democracy was obtained by subtracting the regression coefficient for ICT expenditures from the third model from the analogous coefficient in the first model. The *t*-test statistics obtained from these two separate models were then used to conduct Sobel tests [25], by which the significance of the mediation could be determined. The results of all of these analyses are presented and discussed in the following section.

4. Results

In this section, we report the results obtained from analyzing our forward-looking datasets against the least-squares regression models, and interpret those results in light of our hypotheses.

Hypothesis 1 posited that higher levels of ICT expenditures would directly result in increased FDI activity. The results of the model examining this hypothesis are presented in Table 1. As indicated by the positive regression coefficients in the table, hypothesis 1 is fully supported. From a temporal perspective, we see that rate of increase of the positive effect diminishes slightly over time, but

nevertheless remains positive. This indicates that ICT expenditures continue to have a strong and growing positive impact on attracting FDI well after the investments are made. This relationship is depicted graphically in Figure 3.

Table 1. Direct impact of ICT expenditures on foreign direct investment activity

Year Following ICT Expenditure	Regression Coefficient	R-Square
1	0.424***	0.167
2	0.451***	0.206
3	0.473***	0.231
4	0.491***	0.241
5	0.512***	0.246

***significant at $p < 0.001$

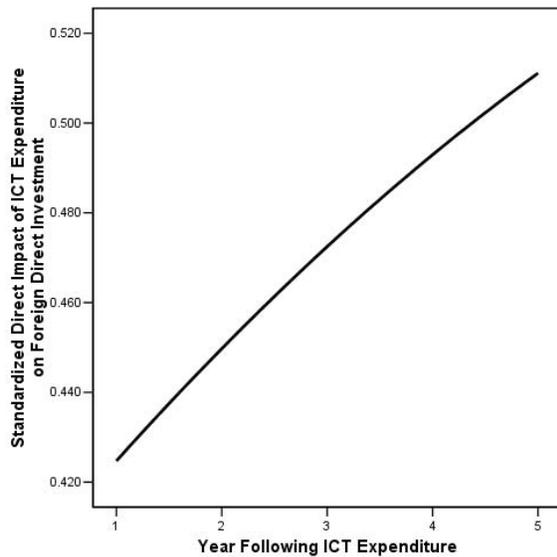


Figure 3. Direct impact of ICT expenditures on foreign direct investment over time

Hypothesis 2 posited that higher levels of ICT expenditure would directly result in increased institutionalized democracy. The results of the regression model examining this hypothesis are presented in Table 2. Again, the positive regression coefficients shown in Table 2 indicate full support for this hypothesis. The size of the direct impact of ICT expenditures on institutionalized democracy in developing countries was found to increase consistently over time, with regression coefficients ranging in size from a minimum of 0.361 in the first year following the ICT expenditure to 0.434 in the fifth year following the ICT expenditure. This trend

indicates that ICT expenditures have a lasting and growing positive impact on the level of institutionalized democracy in developing countries. This relationship is depicted graphically in Figure 4.

Table 2. Direct impact of ICT expenditures on institutionalized democracy

Year Following ICT Expenditure	Regression Coefficient	R-Square
1	0.361***	0.121
2	0.374***	0.129
3	0.386***	0.132
4	0.406***	0.134
5	0.434***	0.136

***significant at $p < 0.001$

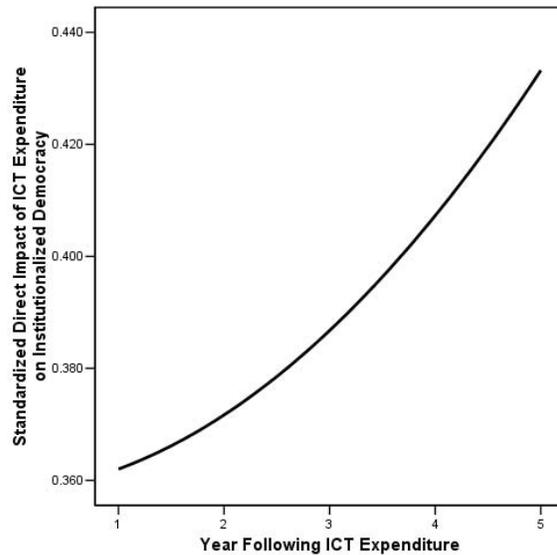


Figure 4. Direct impact of ICT expenditures on institutionalized democracy over time

Hypothesis 3 posited that the degree of institutionalized democracy in a developing country would mediate the relationship between ICT expenditures and the country's ability to attract foreign direct investment, such that the strength of the relationship between ICT expenditures and FDI would increase as the level of institutionalized democracy grows. The results of the regression models examining this hypothesis are presented in Table 3.

Table 3. Indirect impact of ICT expenditures on foreign direct investment as mediated by institutionalized democracy

Year Following ICT Expenditure	Mediation Coefficient	Sobel Test Statistic (Z-score)
1	-0.005***	4.741
2	0.005***	4.787
3	0.013***	4.646
4	0.019***	4.394
5	0.024***	4.095

***significant at $p < 0.001$

As shown in the table, the mediation coefficients and associated significances indicate support for this hypothesis. Interestingly, the indirect impact of ICT expenditures on foreign direct investment as mediated by institutionalized democracy is slightly negative in the first year following the ICT expenditure, however the overall trend becomes more and more positive. These results indicate that on average, ICT expenditures have a positive indirect effect on FDI, which is mediated by the level of institutionalized democracy. This relationship is depicted in Figure 5.

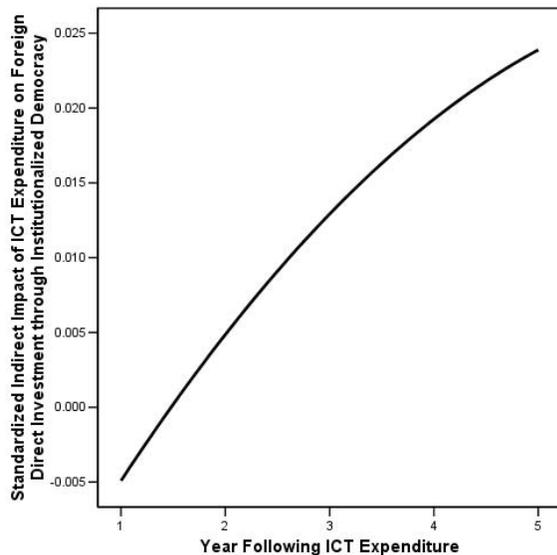


Figure 5. Indirect impact of ICT expenditures on foreign direct investment over time as mediated by institutionalized democracy

5. Discussion, implications, and limitations

Consistent with our integration of the AST, TNS and GLA theories, ICT expenditures were found to directly increase the level of institutionalized

democracy and foreign direct investment in developing countries. As expected, the level of institutionalized democracy was found to mediate the strength of the relationship between ICT expenditures and foreign direct investment. Our theoretical basis suggests that local adaptation to globalization is consistent with the finding that ICT expenditures take some time to have an impact because subsystems within the sociosphere require time to adapt. What was unknown prior to the current study was how much time is required before positive impacts are realized. Our findings indicate that the positive direct impacts of ICT expenditures on democracy and foreign direct investment begin within one year of the initial expenditure, and that the positive indirect impact of ICT expenditures on foreign direct investment begins approximately one-and-a-half years after the initial ICT expenditure when mediated by institutionalized democracy. These positive impacts were observed to then continue throughout subsequent years with increasing impact to institutional democracy, foreign direct investment, and foreign direct investment as mediated by institutionalized democracy. The significance of the lagging effect to local policy makers is that expectations can be set with respect to evaluating potential ICT expenditures on both the economic and polity subsystems of the sociosphere. Also, and perhaps most importantly, the results of this study provide policy makers with compelling evidence that ICT expenditures play a significant role in influencing democratization in developing countries.

There are some caveats to these findings based on inherent limitations to studies of this type. Although this study explores how ICT expenditures attract foreign direct investment in twenty-nine low and middle-income developing countries, the lack of availability of high-quality data prevents examination of the extent to which the same effect holds in dozens of other developing countries around the world. It will therefore be quite difficult to determine if the results presented here can be generalized to those countries for which data are not presently available. Further, as the institutionalized democracy measure employed in the study was an aggregation of other measures, future efforts should seek to assess the extent to which the subcomponents of that measure contribute to the observed effects.

Although employing regression models as an analytic technique yielded some interesting results in the current study, these models are limited insofar as they allow only for a single measure of ICT expenditure and foreign direct investment to be considered at a given time. The multifaceted and complex nature of investments into ICTs and

economic inflows from foreign sources signifies not only that measurement error is likely to exist, but also that latent factors may underlie the observed measures used in the present study. To that end, our future efforts will seek to reveal and confirm these latent factors by identifying and incorporating additional variables into the measurement model that will more fully subsume the complexities associated with these constructs. Furthermore, regression models do not allow for the simultaneous estimation and examination of the direct and indirect effects hypothesized to exist between this study's investigative constructs. These models also assume zero measurement error -- an assumption that is often unrealistic for social science research. We are therefore in the process of adapting a methodological approach that will allow for the resolution of many of these limitations. It is hoped that resolving these methodological limitations will allow for the identification and presentation of more comprehensive and in-depth conclusions.

6. Conclusion

The current study demonstrates not only that ICT expenditures have positive direct and indirect effects on the level of foreign direct investment in developing countries, but also that those effects continue well after the ICT expenditures are made. Our results further indicate that ICT expenditures increase the level of institutionalized democracy in developing countries. Finally, it was shown that positive indirect impacts of ICT expenditures on foreign direct investment are realized through the mediating variable of institutionalized democracy.

Our approach and conclusions provide several important foundations for future research. First, the theories we have integrated suggest that a cumulative research agenda related to ICT impacts on developing countries should be undertaken, as ICTs unquestionably impact the social and economic fabric of those countries. Second, the current study demonstrates the importance of methodologies and constructs that anticipate time-lagged effects to research that utilizes adaptive structuration theory, global and local adaptation, or the theory of network society as a theoretical framework. Finally, we believe that studies formulated from the traversal of the alternate paths shown in Figure 2 will increase the scientific community's understanding of the issues surrounding ICTs in developing countries. The approach presented in this paper serves as an effective constructivist framework for conducting research that will allow for the integration of empirical investigations in this area. This analytic lens may also

prove useful in examining the ICT experiences of developed countries, thereby yielding patterns of success that can inform ICT policy making.

7. References

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